

What is claimed is:

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- Sub A2
- Sub B1
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1. A method of communication between a client computer and a server computer connected to the client computer by a communications network, the method comprising the steps of:
 - (a) selecting, at the client, a logical point of access to a file, the logical point of access being associated with a logical reference uniquely identifying the file independently of an electronic address at which the file is located;
 - (b) identifying, at the client, an electronic address corresponding to the logical reference; and
 - (c) receiving, at the client, the file identified by the logical reference.
 2. The method of claim 1, wherein the identifying step is performed at the client by reference to a list of physical references at the client, the list of physical references listing at least one electronic address for each logical reference.
 3. The method of claim 2, wherein the identifying step is performed at the client by a program for selecting a server and the method further comprises the step of:
 - (d) receiving at the client the program for selecting a server.

4. The method of claim 3, further comprising the step of:
(e) receiving at the client a parent file containing the
logical point of access;
wherein step (d) is performed during step (e); and
step (e) is performed before step (a).

5. The method of claim 4, wherein the list of physical
references is appended to the parent file.

6. The method of claim 5, wherein the server modifies the
parent file to include the list of physical references
before transmitting the parent file to the client.

7. The method of claim 6, wherein the server transmits the
program for selecting a server to the client.

8. The method of claim 7, wherein the server modifies the
parent file to include the server selection program.

9. The method of claim 7, wherein the server computer
modifies the parent file to include a reference to the
server selection program before transmitting the parent
file to the client.

10. A method of communication between a client computer and a
server computer connected to the client computer by a
communications network, the method comprising the steps
of:

~~(a) receiving, at the server, a request for transfer to a client of a parent file containing a logical reference, the request being in the form of a physical reference;~~

5 (b) modifying the file, at the server, by inserting therein a list of physical references corresponding to each logical reference; and

(c) transmitting, from the server to the client, the ~~modified file and the server selection program.~~

10 11. The method of claim 10, wherein the method further comprises the step of:

(d) modifying the file, at the server, by inserting therein a program for selecting a server.

15 12. The method of claim 10, wherein the method further comprises the step of:

(d) modifying the file, at the server, by embedding therein a reference to a program for selecting a server.

Sub 13. The method of claim 12, wherein the method further comprises the step of:

20 AH (e) transmitting, from the server to the client, the server selection program.

14. A method for communication between a client computer and a server computer connected to the client by a

~~communications network, the method comprising the steps~~
of:

- 5 (a) requesting, at the client, a file identified by a logical reference, the logical reference uniquely identifying the file independently of an electronic address at which the file is located;
- 10 (b) identifying, at the client, an electronic address of a file corresponding to the logical reference, the electronic address identifying a server and the location of the file on the server; and
- (c) requesting transmission of the file from the server to the client using the electronic address identified in step (b).

15. The method of claim 14, further comprising the steps of:

- 15 (d) requesting, at the client, transmission of a parent file from a server to the client, the parent file containing the logical reference, step (d) being performed before step (a); and
- 20 (e) receiving the parent file at the client, the parent file containing a list of electronic addresses corresponding to each logical reference, and a program for selecting a server upon a request for transfer of a file identified by a logical reference, step (e) being performed intermediate
- 25 ~~steps (d) and (a).~~

16. A client computer comprising:

a memory for storing programs and data;

a processor for executing programs;

a parent file, stored in the memory, containing a logical reference uniquely identifying a file independently of an electronic address at which the file is located;

5 a list of physical references, stored in the memory, listing at least one electronic address for each logical reference; and

10 a program, stored in the memory, for selecting a server responsive to a request for the file identified by the logical reference, the program requesting the file using an electronic address from the list indicating the file's location on the selected server, and to repeatedly select an alternate server and submit an alternate request if the file is irretrievable from the selected server until the file is transmitted to the
15 client or until the file has been requested from all servers identified in the list.

17. The client of claim 16, wherein the server selection program selects a server which is most likely to provide
20 a fastest response time.

18. The client of claim 17, wherein the server selection program selects an alternate server which is most likely to provide a next-fastest response time, if the first-selected server fails to begin transmission of the
25 requested file to the client within a predetermined amount of time.

19. The client of claim 18, wherein the program for selecting a server is comprises an instructional applet written in the Java programming language.
20. The client of claim 19, wherein the applet employs object signing technology to open connections to various servers and to save its state on a storage device on the client.
21. The client of claim 20, wherein the server selection program determines a server's expected response time on the basis of the server's times for response to past requests from the server selection program.
22. A server computer comprising:
a memory for storing programs and data;
a processor for executing programs;
a program, stored in the memory and executable by the processor, for transmitting, responsive to a request therefor, a parent file containing a logical reference, the program being capable of modifying the parent file by inserting a list of electronic addresses corresponding to the logical reference contained in the parent file before transmitting the parent file to the client.
23. The server of claim 22, wherein the server stores in the memory a replication directory associating logical references to files with electronic addresses of the files stored on a plurality of servers, the list of

electronic addresses being excerpted from the replication directory.

24. The server of claim 23, further comprising a second program for modifying the parent file by inserting a program for selecting a server upon a request for a file identified by a logical reference before transmitting the parent file.

25. The server of claim 23, further comprising a second program for modifying the parent file by inserting a reference to a program for selecting a server upon a request for a file identified by a logical reference before transmitting the parent file to the client.

26. The server of claim 25, further comprising a third program for identifying a status of each server identified in each electronic address in the replication directory as either a parent or child of the server in a genealogy tree representing servers storing the file.

27. The server of claim 26, further comprising a fourth program for tracking the server's load and to autonomously determine when, on the basis of the server's load, to delete one of the server's files, to delete the file, to update the server's replication directory to remove the electronic address of the file on the server, and to propagate an update request to all parent and

children of the server in the replication directory requesting the parent and children to update their respective replication directories.

5 28. The server of claim 27, further comprising a fifth
program for tracking the server's load and to
autonomously determine when, on the basis of the server's
load, to create or delete a replica of one of the
server's files on another server, to create or delete a
replica on another server, to update the server's
10 replication directory to add or delete the electronic
address of the file on the other server, and to propagate
an update request to all parent and children of the
server in the replication directory requesting the parent
and children to update their respective replication
15 directories.

20 29. The server of claim 28, further comprising a sixth
program for updating the status of a server in the
replication directory from child status to parent status
when the server computer deleting the file is a root of
the genealogy tree.

30. The server of claim 29, further comprising a seventh
program for batching several updates into a single update
request.

31. The server of claim 30, further comprising a eighth
program for transmitting to another server, along with an
update request, a local timestamp indicating the time at
which an update to the server's replication directory was
made, the other server receiving and retaining a record
of the timestamp and updating the replication directory
if the last received timestamp is more recent than the
retained timestamp.

32. The server of claim 31, further comprising a ninth
program for retaining the timestamp for a limited period
of time, the other server updating the replication
directory if a timestamp is received along with an update
request and no timestamp is then retained by the other
server.

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